SPRING NUMBER

Winter Course Students

TAKE NOTICE!!

You, the Short Course Students of 1906 are to be congratulated. The great mass of facts which you have accumulated in ten short weeks will be thought over and "digested" after you have reached your homes. Thus money making facts are gained, your point of view is widened, and the standard of home living raised.

BUT! do you ever feel that you are necessarily being rushed too fast, that hundreds of important questions are not asked on account of lack of time, that some subjects are being rushed over before they are well understood?

When you get home and get time to think, these questions will recur to your mind and then is the time you need help. Go ahead and get together all the facts possible, take them home, then register with the HOME CORRESPONDENCE SCHOOL in order that, in working over this material at your leisure, you may have the personal help of your teachers by mail. There is no limit to the number of questions you may ask. Be sure and drop the HOME CORRESPONDENCE SCHOOL a line and receive catalogue and full details. Write now before you forget it.

Note the following:

Our School comprises four principal departments: Academic and Preparatory; Agricultural; Commercial; Normal and Common School. In our Department of Agriculture we offer the following courses:

A course in General Horticulture, including Fruit Growing, Vegetable Gardening and the Elements of Landscape Gardening, also special courses in Botany, Floriculture and Landscape Gardening under Prof. John Craig of Cornell University and J. Eliot Coit, Editor of The Cornell Countryman.

A course in General Agriculture under Prof. Wm. P. Brooks of the Massachusetts Agricultural College. The text-books which form the basis of this course are entitled: "Soils and How to Treat Them," "Manures, Fertilizers and Farm Crops" and "Animal Husbandry." They were written by Prof. Brooks expressly for our use in correspondence instruction but have since been adopted as text-books for class-room work by most of the leading agricultural schools and colleges of the country. They are quite generally conceded to be the most satisfactory text-books of general agriculture which have yet been published.

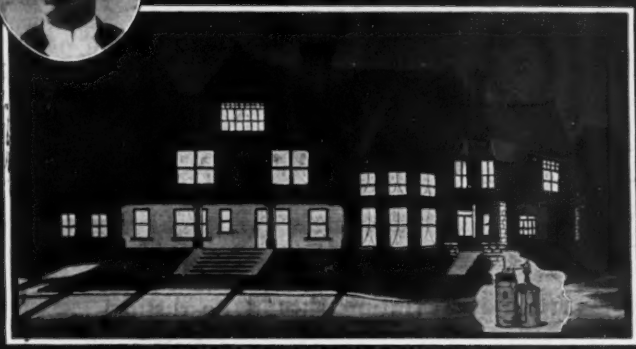
A course in Agricultural Bacteriology under Prof. Herbert W. Conn of Wesleyan University.

The Home Correspondence School

Springfield, Massachusetts

DEPT. 21

I AM THE MAN WHO TURNS NIGHT INTO DAY



THE RADIANT ACETYLENE GENERATOR

Talk No. 1

JUST A WORD WITH REGARD TO

LIGHTING YOUR HOME

With my Patent Dissolving Process, you can have Artificial Sunlight in your home. By this process I have made Acetylene a practical commodity, indispensible to all who know its merits. I long since made a profession of the study of Acetylene, and its practical uses, and have solved the problem of **HEATING and COOKING** with Acetylene.

Thousands are enjoying the use of this system, all over the land, owing to its superiority over city gas or electricity.

It combines **LUXURY and ECONOMY**, as it is not only the most beautiful artificial light known, but also the cheapest. It is in daily use in many of the largest cities, as well as in smaller towns, and country homes.

The machine is wonderfully **SIMPLE AND EASY TO OPERATE**, is installed in the home, and a child can operate it.

The machines are perfectly **AUTOMATIC**, and will run for weeks, or months, without any care or attention, according to the amount of light used and the size of the machine installed. The **Radiant** only has this process.

It is the **SAFEST** system of artificial lighting known, is used in many almshouses and similar places purely as a matter of safety.

If this interests you write for Booklet B, entitled *"Acetylene for the Home,"* by Rush. Address . .

J. K. Rush *Pres'd't & General Mgr.*

THE RADIANT ACETYLENE GENERATOR

THE RUSH ACETYLENE GENERATOR CO.
CANANDAIGUA, N.Y., U.S.A.

Cornell Tests Prove the Radiant the Best

This machine is now in use at the Forcing House at Cornell University, where it has been in successful operation since January '05. We shall be pleased to send you copy of a letter regarding this ideal system of Artificial lighting, and Heating, which shows why the Radiant IS THE BEST Acetylene Generator on the market. You can have our beautifully illustrated book on this subject for the asking.

THE RUSH ACETYLENE GENERATOR CO., CANANDAIGUA, N. Y.
NO. 14 RUSH PARK

SHORT TALKS ON PRINTING

THE ITHACA PUBLISHING COMPANY

OPPOSITE CITY HALL, ITHACA, NEW YORK

¶ Your printing should be distinctive, it should reflect your taste and characteristics. Your personality should find expression in the text and typographical arrangement.

¶ To the creation of just such printing all our energy is given. It is not the result of promiscuous effort, it is the experience of expert craftsmen, from the beginning to the completion of the work.

¶ Are you interested in character printing—the kind that brings business; that tells the character of your store and your goods? We do it that way.

¶ A letter to THE ITHACA PUBLISHING CO., will receive prompt attention. Estimates given on all kinds of work.

MANY GRADUATES

Of the engineering colleges are constantly sending to us for books upon which we sometimes save them as much as 20 Per Cent. After talking the other day with a graduate in Agriculture, who remarked that he almost saved his car fare by coming to buy of us, we thought it a good idea to let more know of this fact.

When you need Agricultural books write us about the prices. Remember the letter costs you only two cents. Address

CORNELL CO-OPERATIVE SOCIETY

Morrill Hall ITHACA, N. Y.

The Official Babcock Tester

Invaluable to the Dairyman seeking to develop his herd to the highest profitable production. Also used in hotels, restaurants, laboratories and doctor's offices. Furnished with full complement or accurate glassware, acid and full directions for making tests. 2 and 4 bottle sizes. Can be clamped to table or screwed down. Circular and prices on request.

We are the largest manufacturers of dairy and creamery machinery and supplies in the world. High grade goods only. Complete outfitters of all plants for handling milk products. .·. Catalogue on request.

CREAMERY PACKAGE MFG. CO.

CHICAGO, ILL.

MOST PROFITABLE OF ALL FARM MACHINES.

This is what the **De Laval Cream Separator** has proved to be,—proved to be a necessity to anyone owning three or more cows. Twenty years of experience on the part of hundreds of thousands of **De Laval** users bear witness to this fact. Likewise has the **De Laval** proved to be the **most profitable of all cream separators.** The superiority of **De Laval** construction is responsible for this fact. In the first place, of equivalent capacities the **De Laval is actually cheapest,**—then the use of the "Alpha" or "Disc" and patented "Split-Wing" skimming device, enables the **De Laval** to gain and save twice as much as the best of imitating separators, while the simple, mechanically correct, low speed gearing of the **De Laval** makes it **capable of lasting four times as long as other separators.** And again its operation is accomplished with the greatest possible ease and economy, all of which in addition to a hundred other features of superiority make the **De Laval separator the best that money can produce.** As for the first cost, if you have the ready cash there is a fair discount for it, but if not, any reputable buyer may buy a **De Laval** on such liberal terms that it means securing the **best of separators actually free of cost,** for it will earn its cost and more while you are paying for it. Write for new catalogue and full particulars.

THE DE LAVAL SEPARATOR CO.

RANDOLPH & CANAL STS., CHICAGO.
1213 FILBERT STREET, PHILADELPHIA.
9 & 11 DRUMM ST., SAN FRANCISCO.

General Offices:
74 CORTLANDT STREET,
NEW YORK.

121 YOUVILLE SQUARE, MONTREAL.
75 & 77 YORK STREET, TORONTO.
248 MCDERMOT AVENUE, WINNIPEG.

CONTENTS—MAY, 1906

Cover Design, Apple Blossoms	*By the Editor*	
Cornell Forcing Houses	*Frontispiece*	
The Geography of Fruit Growing	*Prof. John Craig*	181
Acetylene Light for Forcing Plants	*Martin J. Iorns, G.*	183
Study Men as Well as Methods	*S. E. Robinson, G.*	186
Forcing Plants by Means of Ether	*J. Eaton Howitt, G.*	187
The Effect of Different Chemical Substances on the Flowers of Plants	*J. C. Hogenson, G.*	188
Forcing Bulbs by Means of Ether	*Claude I. Lewis, G.*	190
Some Effects of Shade on Plant Growth	*W. H. Homer, G.*	191
Some Recent Work on Mushrooms	*P. M. Növik, Sp.*	192
Propagation of Conifers	*A. D. Taylor, G.*	194
Editorials		
The Pedagogics of Horticulture		196
Concerning School Gardens		197
General Agricultural News		197
Cornell News		
Campus Notes		199
Former Students		202

THE CORNELL COUNTRYMAN is an Illustrated Monthly Magazine, published by students and graduates of the Cornell University College of Agriculture.

MANUSCRIPT for publication should be received by the 10th of the month preceding that in which it is to be published.

SUBSCRIPTIONS, $1.00 per year, 10 cents per copy. At the expiration of each Subscription, notice and renewal blank will be enclosed. In order to insure renewal remittance should be made before the publication of next issue

ADVERTISING RATES made known on application. We aim to advertise reliable firms only.

ADVERTISING COPY should reach us by 15th of month preceding issue.

ADDRESS all communications to,

The Cornell Countryman, Ithaca, N. Y.

Entered as second-class matter at the post office at Ithaca, N. Y.

COPYRIGHT 1906 BY THE CORNELL COUNTRYMAN.

THE HORTICULTURAL FORCING HOUSES, CORNELL UNIVERSITY

The portrait is that of Mr. C. E. Hunn, Gardener, who with a kindly and personal interest in each student has presided here for the past twelve years. The figure in overalls near the door is that of Prof. L. H. Bailey. Around this cluster of buildings, familiar to so many horticulturists, was gathered the inspiration and enthusiasm which resulted in the Rural Science Series, the Garden Craft Series, the Cyclopedia of American Horticulture and scores of minor publications.

THE CORNELL COUNTRYMAN

VOL. 3. MAY, 1906 NO. 8

THE GEOGRAPHY OF FRUIT GROWING

By John Craig

Professor of Horticulture, Cornell University

AN excellent index to the horticultural progress of any country is afforded by the development of regions and locations in response to the discovery of their special adaptations. Time was when the commercial peach growing of this country was practically restricted to Delaware and New Jersey. New England produced a few for home use and local consumption but the two states named are responsible for such early advertising as the United States received as a peach growing country. Since that time great developments—almost revolutions—have occurred. Delaware is no longer pre-eminent; in fact no state is pre-eminently a peach growing state. The intervening period has been one of discovery and exploitation—sometimes hasty and ill advised. What is true of the peach is more or less true of the other leading orchard fruits of the North.

The peach like the apple is a great staple, and while the possibility of over production is frequently urged by the conservative, it is safe to say that in the average of years this has not occurred.

IMPORTANT PEACH REGIONS NOW BEING DEVELOPED.

In the East there is a good deal of planting activity in the hill lands of Connecticut, in Massachusetts to a less degree, while in New York, Ontario and Ohio the profitable area does not extend rapidly because it is more or less arbitrarily limited to the region over which Lakes Erie and Ontario spread their modifying influence.

Notable additions have been made to the peach orchards of Virginia and West Virginia in recent years. . But the really phenomenal planting when measured by area, is that which has occurred in the South and Southwest in the last five or six years. The Ozarks of Missouri and Arkansas, the Carolinas, Georgia and Eastern Texas have been and are the scenes of gigantic peach orchard growing enterprises. This is the land of the promoting stock company. The company which plants, cares for, and brings the orchard into bearing and then sells in blocks to small holders, either outright as to management, or selling under agreement to manage the orchard and handle the crop. If these orchards were all cared for and all happened to come into bearing the same year, the effect on the market could hardly fall short of complete demoralization.

The retarding agents in these regions are, transportation problems, spring frosts, summer rains. But for difficulties and loss from these causes it is hard to say where the planting fever would cease. Ten years ago it was not supposed that peach growing could be successfully conducted in southern Georgia much less northern Florida. But the advent of the Peen-to race of peach has carried the southern boundary many miles to the south and has opened up new possibilities. Varieties of this race have fruited as far south as Tampa, Fla. What seedlings grown from these might do we can only conjecture.

APPLE REGIONS.

These have been opening and expan panding in response to two lines of endeavor. 1. The effort to grow staple varieties as cheaply as possible. 2

The effort to produce the highest quality in a given variety. In the East and North—New England and New York—there is a well marked effort to find the locality where a high grade variety attains greatest excellence and cultivate it there by the most approved methods. So we find the famous Newtown receiving attention in Eastern New York and in the elevated parts of Virginia. The Spitzenberg in New York, Massachusetts and, strange to say, in localized areas—as Hood River in the Northwest Pacific. There is a great opportunity in this line of endeavor. One might also mention the Grimes Golden in Southern Indiana where this fine variety is exceptionally handsome in appearance and of good quality.

The staple apples according to regional adaptation are being extensively planted in Western New York, the mountainous regions of the Virginias and North Carolina. A few years ago large apple orchards were projected and planted in the Ozarks of Missouri and Arkansas and the region sprang into prominence as an apple section. Considerable activity is still exhibited in the planting line but the furore has passed and future growth will undoubtedly be more conservative than that of the past. One of the most hopeful signs, is the steady development in Northern regions of elevated, rather rough lands poorly suited to the culture of farm crops but admirably adapted to the production of high grade apples. In these regions such as are found in Connecticut, Massachusetts, New Hampshire, the Lake Champlain section of Vermont and in Central New York steady progress is being made but not more rapid than the possibilities justify.

PEAR REGIONS.

The great pear plantings in recent years have occurred in the Middle South, where the Kieffer and Leconte, the oriental pears, reign supreme in the pear world. California, once noted as a Bartlett region, is battling with pear blight which threatens the life of the industry.

THE PLUM.

It is fair to say that outside of California and the north Pacific Coast, there are no great plum regions in this country, and of course in speaking of plums we are including prunes. Certain regions, however, are being developed in recent years in response to the origination of geographical varieties. As examples we may note the improvement of the Domestica race in northeastern United States, and Americana and its hybrids in the Mississippi Valley, the Angustifolia and its hybrids with the Japanese race in the Southwest.

NUT FRUITS—THE PECAN.

One of the most striking pomological epochs of this or any other period is the great activity now being exhibited in exploiting the pecan. This is a comparatively new fruit, that is from the standpoint of the cultivated varieties. The original home of the pecan is found in the lower levels of the Gulf region in Louisiana, Mississippi, and in Texas. Up to this time these states have enjoyed a monopoly of this truly delicious nut. The bulk of the pecans of commerce come from seedling groves in these regions. Latterly Florida and Georgia have acquired a strong faith in the ability of the soil and climate of these respective states to produce pecans equal to those of any country, and they are justifying their belief by very extensive plantings in southern Georgia and northern Florida. Not only is the pecan being planted by individual growers, but large stock companies are being organized and great tracts developed. In a recent tour through the South, the writer was deeply impressed by the pomological activity in this line. It is quite a counterpart of the ginseng furore of the East, but conducted upon a much more extensive scale and we hope a more stable basis.

CITROUS AND SUB-TROPICAL REGIONS.

In this discussion, California has been excluded because of the sharp contrasts occurring in this state within relatively short distances, and therefore the difficulty of treating it in a satisfactory manner without going greatly into detail. The evolution and history of the citrous industry in Florida is most interesting. Ten years ago the entire state was supposed to be in the orange belt. Growers acted upon this supposition. The story of the disappointments, losses, and failures following the successive freezes of the last decade is one as full of pathos as it is of pomological interest. These recurring cold waves have pressed the northern limit of successful citrous culture farther and farther south, till it has now reached the center of the state, and even there orange growers do not feel entirely safe. It should be noted, however, that there are striking exceptions, and one of these is the commercially successful plantation of Mr. G. L. Taber in the northern tier of counties. Mr. Taber has selected the hardiest strains, and has persevered and is making a success of the industry. However new varieties of hardy oranges, combinations of the Satsuma with the trifoliate species have been made, and vigorous seedlings have appeared which will undoubtedly again carry the orange growing region northward, possibly into Georgia.

The grape fruit belt overlaps the orange region on the south side and runs again southward. There is at the present time a well marked zone of activity in the grape fruit industry, along the southeast coast of Florida. In that coral rock land pomelos are being planted extensively and with much faith in their future. Again south of the grape fruit region we find a section mostly situated on the Keys well adapted to the culture of the lime, which is a fruit somewhat peculiar and particular in its soil requirements. In these Keys purely tropical conditions prevail and with the lime we can find the mango, the surinam cherry, the sapodilla, and on the low shore lands the cocoanut.

The great problem then of the pomologist of today as well as the pomologist of the future is the discovery of the most favorable climatic and soil conditions for the fruits we have and the development of fruits with special adaptations for lands now unoccupied. These finer adaptations are expressed in improved quality and handsome appearance of the fruit, and the discovery of regions where a given fruit will reach its highest excellence is not only the work of the experiment station, but also the field of the individual fruit grower and interested pomologist.

ACETYLENE LIGHT FOR FORCING PLANTS

By Martin J. Iorns, G.

IN these days when the people are demanding the products of Summer at all times of the year, when they want strawberries for Easter and would like to have them for Christmas, when they want all kinds of flowers for all important occasions, be it July or December, the Forcing House becomes very important if not necessary. Anything that will increase the efficiency of the Forcing House, by either increasing the yield, bettering the quality, or shortening the time necessary for obtaining a marketable product becomes of great commercial value.

Light and heat are the two chief agents in forcing growth. Of these, it is easy to obtain and maintain the desired degree of heat; but the light is not under our control and in the Winter time with its short and very often cloudy days, the question of light is a very vital one. If we could only find an artificial light that would be a substitute for the sunlight, it

would solve many of the problems of commercial forcing and be of immense value to those engaged in the "Forcing" industry. Each illuminant, as it has been developed, has been tried as this substitute for sunlight, in almost

CONTRAST OF LILIE
The larger one had acetylene light during dark hours. The smaller one had only sunshine

every case, with negative or very indifferent results. Acetylene, which most nearly approaches the sunlight in its composition, has come into prominence so recently that it has not received the attention that the other lights have and it was suggested to me that it would be well to see what it would do for plant growth.

One of the first results worthy of mention is that of the absence of any injurious qualities in the light. All other illuminants thus far tried, have showed some of these. Plants of the tenderest foliage were grown so near the naked flame that they were almost scorched without any injury whatever, in fact, the best results were obtained with those plants nearest to the light. Not only was the foliage uninjured by the light, but also the flower and more especially the color and enduring qualities of the blossom were unaffected.

In its power to sustain plant growth, acetylene showed marked results. One of the photographs shows plants that have never seen any sunlight. They were taken into a perfectly dark room before sunrise and only brought out after dark. As will be seen, the bulbous plants produced their flowers and those that had to depend entirely on the soil for their food, produced quite strong plants. Under the power I was using, the latter would not have matured fruit or seed, but it is not improbable that, with much stronger power, they might be grown to maturity. They grew quite well and were of a healthy green, but were not as deep a green as those under the sunlight, neither could I find any starch in the tissues.

The effect on the period of maturing of flower or fruit varied considerably, both with the type of plant and with the house in which the plant was grown. As a general thing, it seemed that the warmer the house and the more sunshine received, the less the visible effect of acetylene light on the plants. It was also clearly shown that the individual plants showed a marked difference in the amount of response they gave to the stimulation of the extra light. This is strikingly shown by the accompanying photographs of the Sweet Peas and Easter Lilies. Last year the Sweet Peas under the Acetylene light blossomed over five weeks ahead of the others

THESE PLANTS HAVE NEVER SEEN SUNLIGHT AND YET HAVE ALMOST NORMAL GROWTH

and there will be an equally great difference this year. The Easter Lily is another striking example of strong response to the additional light. As will be seen in the photograph, the buds are just beginning to show on the lily that has had only the sunlight. This means a difference of several weeks in the time of flowering. This result is also again showing in this year's work. As opposed to these very striking results, the tomatoes, pole beans and leeks showed very little, if any response to the light. The tomatoes under the light have a stronger vegetative growth and in that respect are able to support a heavier crop of fruit, but the fruit is not ripened any sooner. In this they obey the general law, that when we increase vegetative growth we delay fruit development.

The root crops were the most uncertain in their results and it would seem from the results obtained, that soil conditions of moisture and especially of heat, had more effect than any above-ground conditions. Certainly the root crops obtained from the house where there was strong bottom heat gave very different results to those from the house where there was small bottom heat and these, in turn, are widely different results to those from a house where the soil was cool to cold and somewhat damp. No definite results can be given in this case.

In conclusion, I think I can safely say that for some special crops for some special time, the Acetylene will be of undoubted commercial value but as for being an entire substitute for the sunlight or being of commercial value in forcing all forms of plants, it is as yet doubtful, to say the least. What much stronger light will do will require further careful investigation, but even if it be shown that stronger light will support plants of all kinds, and bring them to maturity, the increased expense, at the present cost of calcium carbide, would prevent its being a commercial proposition. We can say, with all truth, that it is the nearest to being a complete substitute for the sunlight that we have found and that its use will increase in forcing houses, especially in those localities where sunshine in the winter months is at a premium.

STUDY MEN AS WELL AS METHODS

By S. E. Robinson, G.

IN the study of orchard methods in apple culture, as in other scientific studies, we are apt to let classification or scientific arrangement obscure the real significance and purpose of the study. We classify orchards according to the methods of culture, forgetting that the reason for the classification is to be found in ourselves rather than in the orchards; that it is subjective rather than objective. For this reason, our artificial classification often gives us a distorted idea of values.

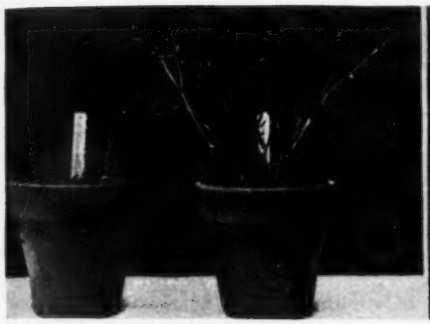
The agricultural economist, in considering the problem of production, recognizes three important groups of factors; under the terms land, capital goods and labor; and that production depends upon the combination of the different qualities and quantities of these factors. A scientific study of the methods of apple production in a given orchard would include, therefore, the consideration under "land" of its location in regard to climate and markets and its soil in regard to its mechanical and chemical condition and the means by which that elusive quality known as fertility is kept up. Under "capital goods" would be included the tools, machinery, and horses for cultivation, the spraying materials, fertilizers, seed for cover crops; and what is of chief importance, the trees. The term "labor" would include both the manual labor and management. But, since our classification is based on the means taken to make available the plant food in the soil and to supply that taken out by the crops removed, we are more than apt to regard these operations of too much importance. It leads us to consider rather the value of this and that fertilizer, method of cultivation, pruning or spraying in the care of an orchard than all those things which go to make one a good student of orchard conditions.

Recently during a trip to various orchards of Western New York the writer visited two orchards in close proximity to each other. The owner of the first was just leaving for town in his automobile, but in the course of a brief conversation he stated that he had paid for an orchard in two years with the crops taken from it. The second man was, together with his men, laboring with some large timbers. He briefly granted permission to examine his orchard, saying "Go where you want to. Yes, I pasture it; have no other grass. No, it is not profitable."

The orchards were similar in location, soil, age and varieties. The greatest difference between them was in the men who tilled them. One was a student of orchard conditions; the other was *too busy with manual labor to be a student.*

Perhaps the two most striking facts coming from a study of orchard methods in New York are that, by reason of the great variety of conditions which may reasonably be expected to influence the performance of an orchard, every orchard combines different factors or influences and consequently presents different problems and that the men who have the best success with their orchards are those who have been thorough students of their own problems. They have had the attitude of scientific students, accepting nothing as a rule of practice till they had tested it with careful thought and experiment.

There are as many methods of orcharding as there are orchardists; every man must meet his own peculiar problem with a method of his own development, the product of his own thought. A classification of orchards according to culture methods is useful in the study of orchard problems, but it should not stand in the way of a study of orchardists.



No. 1—ASTILBE JAPONICA
Showing increase in growth due to etherization

No. 2—PERSIAN LILAC, SYRINGA PERSICA
Showing increase in bloom due to etherization

FORCING PLANTS BY MEANS OF ETHER

By J. Eaton Howitt, G.

THE art of forcing plants dates back to the days of the luxuriant Romans. It is recorded that they were able to obtain fresh fruits and vegetables for their sumptuous banquets, the year round, by both retarding and accelerating their growth. The elaborate forcing-houses and hot-beds of today were unknown to the Romans. They forced their fruit and vegetables in pits covered with large thin slabs of talc. Heat was obtained from fermenting manure, and by means of hot-air flues. Since the time of the Romans the art of forcing has undergone a gradual development both in the structure of the houses, and in modes and methods of forcing. The present time finds us with elaborate houses, heated with hot water and steam, and with numerous methods of forcing based upon scientific principles. One of the latest of these methods of forcing, now coming into vogue, is the forcing of plants after treatment with ether.

The history of the use of ether in forcing plants is comparatively brief, dating only as far as 1878, when Claud Bernard, the famous French experimenter, described an experiment in which he placed a specimen of the sensitive plant under a bell glass with a small sponge dipped in ether and found that after a lapse of a few minutes the expanded leaves became insensible and ceased to close when touched. Through this experiment of Bernard's contained, as it were, the germ of the new process, the real discoverer, for all practical purposes, was Dr. Johannsen, the well known Danish physiologist of Copenhagen, who, noticing that many plants push forth their buds after a period of repose such as occurs during the winter months, or even in unfavorable seasons during the summer months, conceived the idea that by inducing such a condition of rest by means of anaesthetics the plants would be, as it were, renovated and stimulated and rendered capable of developing their buds with greater vigor. Acting on this theory, Dr. Johannsen carried on the first experiments in the use of ether in forcing plants. His results, first published in Denmark and later in Germany, were so pronounced that they quickly attracted the attention of the growers, both in Germany and France. Numerous experiments carried on by these growers soon demonstrated the fact that many of the flowering shrubs could be profitably forced by the use of ether. That the European growers are convinced of the value of ether for forcing plants, is evident by the fact that many of them have installed etherization apparatus, in connection with their forcing-houses.

Of the plants used for winter forcing perhaps none are more popular than lilacs, *Syringa vulgaris* and *Astilbe Japonica*. Both of these respond quickly and surely to the action of the ether fumes. In experiments carried on in the forcing houses here by the writer, a Persian lilac was placed in the forcing-house on Nov. 24th, after having been subjected to the fumes of ether for 24 hours. The first indications of growth were noticed three days later when the buds were seen to have markedly swelled. Two days later several of the leaf buds completely opened up and by Dec. 11th the plant was in full leaf. The first flower buds opened on Dec. 6th and full bloom was reached by Dec. 25th. The total time from date of placing plant in forcing-house until date of full bloom being 31 days. A check plant, placed in forcing-house on the same date and kept under exactly similar conditions, was considerably slower in its growth, not reaching full flower until six days after the etherized lilac. More marked results than this were obtained when the plants were exposed to the action of the ether fumes for a longer period of time. Thus, a lilac etherized for 48 hours came into full flower in 8 days less time than the check plant, while one etherized for 72 hours made a gain of 10 days over the check plant.

The results obtained with *Astilbe Japonica* are even more striking than with the lilacs. Clumps of *Astilbe Japonica* etherized for 24 hours and placed in the forcing house on Nov. 24th, were in full bloom from a month to five weeks ahead of a clump not etherized. Other *Astilbe Japonicas* etherized at a later date did not show such marked results in favor of the etherized plants but there was, however, in every case a considerable gain in time made by the etherized clumps.

A question which naturally arises is, what is the action of ether in accelerating the growth of plants? There are many theories advanced to explain this phenomenon, none of which have been definitely proved. It would seem, however, most reasonable to suppose that the ether acted in a manner similar to frost and dried out and ripened the plant cells, thus rendering them capable of active growth. If such is the case the ether performs in a few hours what it takes nature several months to accomplish.

THE EFFECT OF DIFFERENT CHEMICAL SUBSTANCES ON THE FLOWERS OF PLANTS

By J. C. Hogenson, G.

IT has long been believed by horticulturists and florists that the soluble mineral constituents of the soil have a great deal to do with the colors of flowers, fruits and foliage of the plants grown upon it. . Not only do they play a large part in determining the color, but also in establishing the extent of growth, flavor, perfume, shape, time of maturity and other desirable qualities of flowers and fruits.

Plants differ most under cultivation because their condition there is unnatural, and they try to adapt themselves to the given conditions.

For a long time, people have been desirous of changing the colors of certain flowers. To do this, many potting mixtures have been recommended, such as; peaty earth, sand, iron filings, wood ashes, alum, and various chemical salts and acids.

This important phase of plant modification is in a very rudimentary state, and it is with a view of throwing some light upon this subject that I have undertaken the following investigations:

Each of the following substances were added to ordinary potting soil and plants potted therein: Iron filings, copper sulphate, sugar, lime, salt, potassium hydroxide, iron sulphate,

alum, pyrogallol, gallic acid, tannic acid, hydrochloric acid, ammonia, wood soot, malachite green, acid rhodomine, easine, uranine and crystall violet. The following plants are being grown in soil prepared with the above mentioned substances: Hydrangias, Primulas, Carnations, Geraniums, Narcissus, Spireas, Lily-of-the Valley, Calla, Lillium longiflorum, Ten-week-Stocks, Heliotrope, Fuchsias, Roses and Hydrangia paniculata.

I have used six Azeleas and six Rhododendrons No. 1 of each being used as a check, No. 2 to which was added ten grams of lime for every five pounds of soil, which would be at the rate of 4.42 tons per acre of calcium carbonate. No. 3 of each received ten grams of lime and ten grams of pyrogallol; No. 4 received ten grams of lime and four grams of tannic acid; No. 5 received ten grams of lime and seven grams of magnesium sulphate;

THESE RHODODENDRONS HAVE BEEN TREATED WITH EQUAL AMOUNTS OF LIME. THE HEALTHY PLANT HAS RECEIVED MAGNESIUM SULPHATE IN ADDITION

The results so far obtained go to show, that with quickly growing plants like Narcussus and Lily-of-the-Valley, no effect is noticeable.

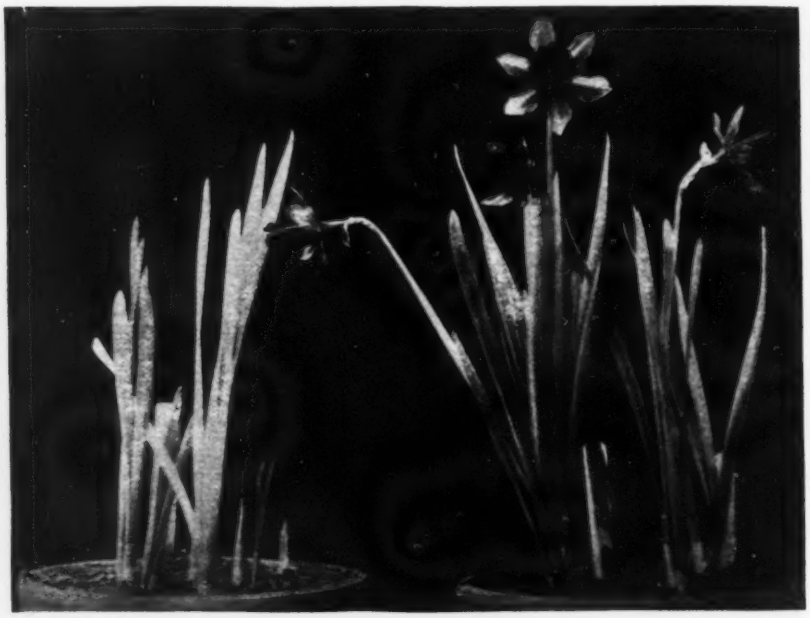
Another experiment is being carried on to determine whether or not such lime-hating plants as Azaleas and Rhododendrons, which grow naturally in an acid peaty soil, can be successfully grown on a limestone soil, by adding a neutralizing agent which will overcome the injurious action of the lime. When such plants are grown in a limestone region, an artificial soil has to be provided for them.

No. 6 received ten grams of lime and four cubic centimeters of concentrated hydrochloric acid.

All began growing well, but soon the leaves of No. 2 began to droop, the flower buds became limp and refused to open. The Rhododendron was dead by Feb. 25 (see picture.) The others all grew vigorously, came into bloom normally, and are apparently in a healthy condition notwithstanding the addition of the large amount of lime in connection with the other substances.

It appears from this that the lime in

limestone soils can be conveniently and economically neutralized, and Azaleas, Rhododendrons and other Ericaceous lime-hating plants grown therein. This may perhaps best be done by adding magnesium sulphate which upon coming in contact with moisture of the soil, hydrolizes and forms magnesium hydroxide and sulphuric acid. The magnesium is absorbed by the soil and plant, thus setting the sulphuric acid free. This tends to neutralize the lime by acidifying the soil. Pyrogallol, tannic acid and hydrochloric acid will also neutralize lime, but care must be taken not to put in too much. The results of this experiment are quite satisfactory.



No. 1 No. 2

LARGE TRUMPET NARCISSUS GOLDEN SPUR

No. 1 Unetherized, No. 2 Etherized, a gain in uniformity of bloom as well as 19 days in time

FORCING BULBS BY MEANS OF ETHER

By Claude I. Lewis, G.

IN another article on etherization in this issue the history of the process and some of the results obtained with shrubs has been given. I will, therefore, give the general methods employed and results obtained with bulbs.

A galvanized iron box two feet and a quarter wide and deep and four and a half feet long was used. This had a cover which came down six inches over the edge of the box on a well felted flange, making a practically air tight box. To further insure that the box would be air tight, the rim of the cover was clamped securely to the box. Several trays were made to allow the placing of the material in layers thus giving the ether a better chance to circulate. In filling the box the shrubs and larger material were placed in the bottom of the box, care being taken to have the soil as dry as possible to prevent absorption of the ether, and the bulbs and smaller material were placed on the trays. A

wad of cotton or felt was placed in the box and upon this the ether was poured and the box closed as quickly as possible. Ordinary sulphuric ether was used, the standard amount being one ounce for every fourteen gallons of space and, to allow for evaporation, small leakage, etc., a small extra amount was used, so that the normal amount of ether used was fourteen ounces. The amount of ether was, however, varied, as one of the objects of the experiments was to determine the amount needed. Accordingly, fractions of this amount were used such as: a quarter, a third, a half, etc. The time which the ether was allowed to act upon the material was also varied. We began with twenty-four hours, increasing to thirty-six, forty-eight and seventy-two. Thus, by combining the various amounts and periods together, a long list of experiments were tried, extending from November until April. The temperature of the room in which the tests were carried on varied from fifty to sixty-five degrees. Bulbs were etherized loose before being potted, after potting, in some cases after being cut and also after they were rooted. Combinations of these were also tried. After being taken from the box they were placed in a room where the conditions were suitable for rooting. In all cases check plants were used. Other experiments were tried in connection with etherization, such as, various soils, temperatures and time left in rooting room before being brought to the forcing room. A large number of varieties of such bulbs as Narcissus, Tulips, Hyacinths, Alliums, Callas, Gladiolus, Lilies, etc., as well as seeds were used.

The results with Narcissus have been very satisfactory, the time gained being from two days to about three weeks. Not only has this been a gain in the time that the first blossoms appeared but there has been a gain in the time that the whole pot was in bloom, a gain in uniformity over the unetherized plant. Narcissus were tried in many varieties and in large quantities and with the exception of "Par Whites" which were badly sprouted, the results were quite marked.

The first two lots of Lillium longiflorum, var. multiflorum, showed no gain in the time at which the first blossoms appeared but gave a decidedly taller growth. The third lot, which was exposed to the action of the ether longer, showed a considerable gain in time as well as in height. Experiments with other bulbs were quite satisfactory but were conducted on a smaller scale. Various seeds, such as peas, beans, radish, melon, lettuce, onion, etc., were tried. Those etherized germinated sooner and more uniformly. In conclusion I would state that, to obtain good results, the etherization should be done before the first of February, and the earlier the better. Plants to be etherized should be dormant, the ether acting as a stimulant to activity and not as an invigorator to existing growth.

SOME EFFECTS OF SHADE ON PLANT GROWTH

By W. H. Homer, G.

SHADE, as a factor in plant growth, is receiving considerable attention at present both among practical gardeners and those who are engaged in scientific horticultural investigations.

During the past twenty years many European botanists, notably in Germany and France, have devoted much study to the effects of shade upon plant growth and development. Many experiments of a more practical nature have been carried on in recent years in various sections of the United States. Large areas in the Connecticut River Valley and in the South are devoted to the culture of tobacco, grown in the shade of a cheese-cloth covering. Only such varieties as are most desirable for cigar wrappers are grown under such conditions, and the fiber of the leaf is

such that the product is said to equal that grown in the tropics.

The quality of such crops as lettuce, cauliflower, celery and rhubarb is materially improved, when grown in the shade. In pineapple and coffee culture shading is now extensively practiced.

Prof. V. A. Clark of the Arizona Experiment Station at Tucson, in a recent paper read before a meeting of the Society for Horticultural Science, held in New Orleans, said: "It is believed that the matter of shading is of greater horticultural importance in arid regions than fertilization is in the East." It is now a well established fact that excessively strong sunlight has a retarding effect upon the growth of most plants. In certain regions of the arid Southwest, tomatoes and cucumbers fail to bear fruit in midsummer. This is thought to be due to the inhibition of the growth of the pollen tubes by too strong sunlight.

Shading reduces transpiration, conserves the soil moisture, and where the cheese-cloth covering is used a slight increase in the temperature of the soil and atmosphere is noticeable. The covering also serves as a protection against frost, drought, damage by wind, hail and insect pests.

Young, vigorous plants with normal leaves often succumb when transplanted, because of a too rapid transpiration. This can be prevented by shading. Plants grown in the shade are usually characterized by having abnormally long stems and petioles, thinner and lighter colored leaves, and unless the shade is very dense the leaf surface is apt to be greater than when the plants are grown in direct sunlight. In the shade the fibrous, woody tissues are less developed, the epidermis is thinner and the plant hairs which seem to serve as a protection against too great transpiration, are reduced in number and size. The internal structure of leaves and stems also becomes much altered in plants grown in shade. There is a strong tendency for the tissues to become homogenious, that is, there is less differentiation as the density of the shade increases.

Long stems are often desirable, as in the case of many flowering plants. Last winter the Lily-of-the-Valley and the Narcissus were grown in the shade at the Cornell Forcing houses, with the result that the flower stems were from three to five inches longer than those grown in the light.

Etiolation may be looked upon, says MacDougal, as a method of reducing the strong and rank flavors of many plants in the effort to make them of economic use. It has been observed that the thorns of many plants tend to revert to the normal form of the organs from which they were originally produced — stems or leaves — when grown in a very damp atmosphere or dense shade. If they are no longer essential to the protection or growth of the plant they may entirely disappear. Strawberry plants when grown in a humid atmosphere and deprived of light may develop blossoms, but the white petals may be lacking. The essential organs, stamens and pistils, will be present, but the petals, not being absolutely necessary for the production of seed or for continuing the life of the plant, will be the first to disappear when the plants are placed in an unfavorable environment.

SOME RECENT WORK ON MUSHROOMS

By P. M. Növik, Sp.

THE increase in interest in Mushroom Culture has been as rapid in this country as anywhere in the last few years. This increase is largely due to the knowledge gained through the investigations which are being carried on at the various experiment stations, and to the wide publicity given to such knowledge.

Mushroom growers have long known a few varieties, but as they were propagated by spawn, the improvement of these varieties was a

AGARICUS ARVENSIS. 54 MUSHROOMS IN ONE CLUSTER

slow and uncertain process. With Prof. Duggar's method of pure culture, the production and improvement of new varieties is easily accomplished and we may expect before long to have spawn on the market of as many mushroom varieties as we have seeds of beans, cabbage or other vegetables. It is much better, therefore, to start systematic variety tests early, before the different varieties and the nomenclature becomes too much confused.

The work done by the writer during the past winter has been confined to a variety test. The trial started last October included some 13 species and

CONTRAST OF VARIETIES
On right Columbia, on left No. 40 Brown. Note difference in thickness of cap and width of gills

varieties. While many difficulties due to lack of proper drainage of the house were encountered, still some definite results have been reached.

The ways in which the mushroom varieties differ are many. The skin may have all colors from dark brown to purest white. The cap may be either thick or thin with more or less broad gills. The proportion between the fleshy part of the cap and the layer of gills may vary from 2-5 of the thickness of the cap to 1-10 or less. The flesh may be either more or less solid or soft and watery, and its color greenish white or pure white or white and pink. The taste differs very much, from the most delicate aromatic flavor to some nearly tasteless. The stem may be long and thin or short and thick, or sometimes broad and then often with a very delicate flesh. The stem of the common *Agaricus campestris* is ordinarily thrown away by the cook as worthless, but this will not be the case with some of the new varieties in which the stem often tastes better than the cap.

The habit of growth varies greatly in different varieties. Some kinds come one at a time, but others come in larger or smaller clusters. The picture shows one large cluster of *Agaricus arvensis* containing 54 mushrooms, the largest cluster the writer has ever seen.

It is with regret that the writer refrains from recommending any particular varieties, but the earliness of the date at which this paper is submitted precluded any reliable statement as to which had proved to be the best variety. The final results will be withheld for future publication.

PROPAGATION OF CONIFERS

By A. D. Taylor, G.

IT can be little doubted that the art of growing Conifers by seed was practiced centuries ago. While the method of grafting the ornamental and fruit trees dates far back to the time of the Carthaginians and the Greeks, we may be quite certain that the method of propagation by seed, the most natural of all, began with the study of Arborculture, years before. As time has advanced great changes have been brought about in this work by the development of new methods and the perfection of old ones. As the newer and the more perfected methods of propagation have been readily adopted in the production of deciduous trees and of fruit trees, we find that in the field of the Conifers these changes have been much less rapid. Even though propagators grafted and experimented with the most delicate plants, yet with great reluctance and much uncertainty did they venture to adopt new methods with these trees, which were fully as well adapted to the methods of grafting and cutting. Hence until comparatively recently they have been grown as a rule from seed almost exclusively.

Today, however, these trees are produced quite freely from cuttings, seeds and grafts. The greater number, including the more common species are raised from seed and imported each year to this country from France and Germany. Many of these are used as stocks upon which to graft the more delicate and finer species and horticultural varieties grown by our nurserymen. The extensive importation of seedlings is mainly due to the cheapness of foreign labor.

The following short table will show the wide range of variation in the viability of the seed of a few of the Conifers:

White Pine	70-80	percent.
Spruce	60-75	"
Hemlock	30-60	"
Fir	30-50	"
Arborvitae	50-75	"
Cypress	25-45	"

With this uncertainty and the length of time required to obtain salable specimens from seed, it is certainly true that the method of cutting, by

which from 85 to 90 percent of the cuttings strike root is much more satisfactory. This method also has been subjected to many changes,—varying from the older one by which cuttings were subjected to a long calousing process to the present one controlled by artificial top and bottom heat. This method with the commercial growers is confined to the genera of what is known as the opposite leaved group, including Arborvitae, Chamaecyparis, Cupressus, Juniper, and Thuyopsis; the genera including the Spruces, Firs and Hemlocks are more easily raised from seeds and grafts than from cuttings.

Cuttings of the deciduous trees are best taken either during September and October or in the last spring, the time varying with the condition of the wood desired; those of the Conifers do best if taken between the months of October and January. Various propagators differ as to the best time of taking these cuttings. One class adheres to the principle that subjecting the cuttings to frost before taking impairs the quality of the wood for cuttings; the others uphold the opposite theory. My experience with cuttings has enabled me to see no apparent difference in the ability of either class to strike root. It is a maxim, however, that cuttings should never be made while in a frozen condition.

There are three distinct types of cuttings, each with its adherents among the different propagators and each with its advantages. Type (a) includes those made from green wood. Type (b) includes those of medium size (4-5 inches long) made from mature wood. Type (c) includes those which are extra large (7-10 in.) made from mature wood. When one considers which of these three types is the best, it is evident that the softer the wood the more easily should the cutting strike root, and also the greater the care needed to obtain the best results. Between the two largest types there appears during the first year no marked difference. The extra root growth of the smallest type and its size when fully rooted is more than overbalanced by the greater size of the larger cuttings with smaller root systems.

The sand and the temperature in the propagating house are strong factors in influencing the growth of the cuttings. Cuttings of these trees grown in a cool house are less apt to suffer ill effects from excessive watering and much less skill is required to make them strike root. Cuttings placed in a house with an average temperature, day and night, of from 50 to 55 degrees will show a much slower growth than similar cuttings in a house with a higher temperature; however the former will withstand a greater variation in the external conditions. The ideal temperature for the best results in rooting conifers ranges from 40 to 45 degrees at night to 60 degrees during the day with a bottom heat as near 45 degrees as possible; this to continue for the first five or six weeks; after which time the top heat should range from 60 to 75 degrees and the bottom heat from 55 to 60 degrees. The sand best adapted is very clean, coarse pit or lake sand as free from organic matter as possible; with the very smallest cuttings fine sand brings better results and for the larger hardwood cuttings the coarse sand is preferable.

It is commonly the case that cuttings of the same genus or species vary greatly in their ability to strike root; Chamaecyparis obtusa and the Siberian arborvitae are the most difficult, it generally taking two years before these have attained sufficient root growth to admit of their being taken from the cutting bed. Retinospora and Lawson's cypress are the easiest to root, while Juniper, American arborvitae and Biota come in the order named, the last being the most difficult of the three.

The problems before the propagators today are to determine the best type of cutting to make, the portion of the tree from which they should be taken, and the finding of a method by which tardy cuttings may be made to strike root in a single season.

The Cornell Countryman

J. ELIOT COIT, Editor
M. W. EVANS, - - Alumni Editor
H. E. ROSS, E. KELLY, MISS L. P. HASTINGS, - Associate Editors
M. P. JONES, - - Business Manager
J. H. BARRON, H. C. PIERCE, - - Assistant Managers

MAY, 1906

The Pedagogics of Horticulture

THOSE who are able to review from the standpoint of personal observation the development of the methods of teaching agriculture and horticulture during the past quarter of a century are deeply impressed by the sweeping changes which have occurred in system and method during that brief period. Indeed, the student of 1906 who has only to review a background of four or five years may note important innovations which make for progress and improvement, in these subjects pedagogically rather difficult.

Twenty-five years ago there were probably not more than half a dozen chairs of horticulture in the country. The teaching in the best of them consisted in obtaining from the student a certain amount of required manual practice work in orchard and garden, a study of the theory of horticulture as expounded by John Lindley accompanied by some training in the propagation of trees and shrubs. Botany was studied from the standpoint of economic plants, zoology from the systematic side, while the student was introduced to the great fields of plant physiology and economic entomology only through the medium of inadequate text-books. Mycology, especially along applied lines, was an unexplored field.

How all this has changed! Where ten courses covered all the studies offered by an entire college of agriculture, it is now found impracticable to condense into that number the studies which should be offered in the province of horticulture alone. Moreover, horticulture in those days was usually expected to include landscape gardening and often instruction in sylviculture.

The tendency towards differentiation has been constant and fairly consistent. Under the head of horticulture we may now group at least four large subdivisions each of which is divisable into two or more co-ordinate parts. These main heads are pomology, with its practical and systematic sides; olericulture, which may be divided in the same way; floriculture, with its plant growing, flower growing and structural departments; and lastly the manufacturing and utilization of horticultural by-products. This latter field has not thus far been exploited by institutions giving instruction in horticulture in this country. There is, however, much demand and vast opportunity.

These are all undergraduate subjects and their strongest features should be the laboratory part. The development of the laboratory is another distinguishing mark of the new teaching. It composes a large part of the undergraduate training and is quite as essential to the graduate student, especially in connection with his investigational efforts which should occupy the major portion of his time and energy.

The mere classification of the branches composing the horticultural group makes it perfectly apparent that it is hardly more reasonable to expect one man to profess a knowledge of or

an ability to teach all if it were physically possible, than it was to expect the professor of agriculture of twenty years ago to cover the field of agronomy, zootechny and dairying. Further separation of naturally divisible parts is bound to come in horticulture and from the standpoint of the student the sooner the better.

The past twenty years have seen marvelous changes in the pedagogics of agriculture. Not less portentous are those which are certain to take place during the next decade.

John Craig.

Concerning School Gardens

THE receipt of a circular letter sent out by the Bureau of Nature-Study at Cornell, concerning school gardens, has reminded us that the season for beginning this work is at hand.

That the school garden has been a decided success, educationally, agriculturally and otherwise, there is but small room to doubt. Its influence has manifested itself in many ways. Pedagogically it is good, as it fulfils the fundamental principle of the Nature-Study idea, namely, that of bringing the child in close contact with the real and the commonplace, and guiding the education that springs spontaneously from this intimate personal touch with his environment. It is difficult to imagine a better method of impressing upon the child the idea of personal responsibility than through the school garden.

Again, the opportunity for vitally relating this garden work to the school studies is a large and profitable one. Indeed, in an ideal school, where Nature-study is not merely correlated with school studies, but is made the fundamental basis of the curriculum and of all school activities, in such a school the influence of a school garden is almost unlimited. Not only will it have its immediate effect upon the school and the child, but also a broader one upon the community. The planting of a single school garden may easily lead to the improvement of the whole town. Shade trees, parks, yards and gutters will be seen from a new point of view, through the eyes of these young gardeners; and in such cases, improvement becomes contagious.

The agricultural value of the school garden is so apparent, and so closely akin to the Nature Study value, that little need be said concerning it. The country school stands in the greatest need of these gardens. Here they should be used, not only for instruction, but also largely for the decoration of the school grounds.

That school gardens have done much good in the past is quite evident; still more obvious is it that, in the ideal day when every school house has its garden, and every school child is an evangelist of the beautiful in the commonplace, the possibility of good will be unlimited.

GENERAL AGRICULTURAL NEWS

The first number of the Agricultural Journal of India has been issued from the agricultural institute at Pusa. The new journal is a quarterly and is devoted to matters of general interest in the line of agricultural research throughout India. All the more technical papers are to be published in another series entitled "Memoirs of the Department of Agriculture in India."

The first number of this journal

contains a long article by the inspector general of agriculture in India, in which he outlines the present condition of agricultural affairs and the measures which the government is planning to take for its development. All of the existing departments are to be enlarged and improved.

The system of Indian experiment stations includes thirty-nine stations and farms besides the research institute at Pusa. Some of these are devoted to the study of some particular product like cotton or the tropical fruits while the others are general in their nature. The government has recently made a grant of $660,000 which is nearly three times as large as the present income. It is to be hoped that even this may be materially increased in the future and will allow for the development of the stations and ensure a considerable increase in the practical work and experimentation.

* * *

Massachusetts Agricultural College has a new Horticultural Building.

The department of horticulture and landscape gardening in Massachusetts will soon be housed in Wilder Hall its new home. The building cost approximately $40,000 and is of red brick with terra-cotta trimmings and is practically fireproof in its construction.

The building is three stories high and contains besides the ordinary laboratories for the study of Pomology; grafting rooms, class rooms and offices, a well-equipped photographic room and a drafting room for the use of the students in landscape gardening.

The building is named in memory of the Hon. Marshall Pinckney Wilder, who has been closely connected with the progress of horticultural science in Massachusetts, and for the last quarter of a century a trustee of the college.

* * *

Reports from the North Carolina Agricultural Department announce the resignation of Prof. H. H. Hume, Horticulturist, to accept a similar position in the new McDonald Agricultural College of Quebec. It is expected that this college will be opened to students by September, 1906.

* * *

The main building of the Idaho State University and Agricultural College was burned March 30. This was the finest building on the campus being erected only a short time ago at a cost of $225,000. It contained all of the offices of administration and many of the class rooms.

* * *

Kenyon L. Butterfield, who recently resigned the presidency of the Rhode Island Agricultural College to take that of the Massachusetts College, will be succeeded in his work in Rhode Island by Prof. Howard Edwards who now holds the chair of modern languages in the Michigan Agricultural College.

* * *

The question of a standard agricultural course was brought up at the recent meeting of the Association of American Agricultural Colleges and Experiment Stations held in Washington, D. C., by Prof. F. W. Rane of the New Hampshire College.

Prof. Rane recommended that uniform requirements should prevail in all the institutions teaching agriculture. At the present time there is the utmost confusion in the various institutions. Senior subjects of one college are given in the freshman year in other colleges. All of the fundamental sciences should be given in the first two years. The junior and senior years should be largely elective to give the student an opportunity to take up the branches which appeal to him most.

The first two years of the course as outlined by Prof. Rane is practically the same as that given at Cornell.

* * *

The Madison Democrat reporting the investigations of the legislative committee at the University of Wisconsin, has the following:

While waiting for a witness to be brought in, the investigating committee fell to discussing informally the quality of students that had appeared before them, and finally agreed that the brightest, most self reliant young men they had examined in their investigation of weeks were those of the agricultural school. They seemed to have their work in hand most completely of any that have appeared before the committee; they think about their studies, and are not worrying about athletics or social functions. The committee spoke of this as the bright spot in the splendid work being done by the College of Agriculture.

The committee seem to have found little to criticise and a good deal to commend in the investigation of the College of Agriculture.

CORNELL NEWS

CAMPUS NOTES

As the Dairy Building had to be given over to the contractors of Goldwin Smith Hall by April 1st the occupants had to seek new quarters. Prof. Wing's office is now directly under the Treasurer's office in Morrill Hall, Prof. Pearson is on the first floor of Stimson Hall at the west end, in the old Faculty room; Prof. Rice has moved up to the Poultry Building. It is hoped that this temporary arrangement will be only necessary for a short time.

* * *

At a recent meeting of the Agricultural Association, E. H. Anderson was elected captain of the college baseball team and E. Kelly, manager; C. B. Tillson, commodore of the college crew, and W. H. Alderman, manager.

* * *

On April fifth Dean Bailey addressed the Oneida County Grange at Utica; on the seventeenth he attended a meeting of the Executive Committee of the Association of American Agricultural Colleges and Experiment Stations at Washington, D. C. On the twenty-seventh a lecture was given at Middleboro, Mass., before the Massachusetts State Federation of Woman's Clubs. The next day he appeared at Hamburg, N. Y., before the Erie County Teachers' Association and spoke on "Manual Training, Nature Study and Agriculture in the Schools."

Twenty students are engaged in the soil mapping course under Prof. Fippin. Before the course is completed the Roberts pasture, alfalfa field and the Mitchell farm will be mapped.

* * *

Arrangements have been made to make an "Agricultural Survey of Tompkins Co." during the summer. The soil types and conditions are to be investigated. The whole county will not be surveyed this summer. The work will be in charge of Paul J. White, graduate student.

* * *

A Soil Survey of Tompkins County, carried on by Profs. Bonsteel and Fippin for the past two years has been completed.

* * *

Work on the University Farm has commenced. The investigations concerning timothy will be continued. Five thousand new plants were set out this year, making a total of 17,000 plants. Some new experiments to find out the life of a clover plant will be started this year.

* * *

A bulletin on buckwheat has gone to the printer and will be published in a short time.

* * *

Charles F. Clark, Grad., has been appointed Assistant Agronomist in place of Samuel Fraser, resigned. Mr. Fraser will take charge of the 14,500

acre estate of Major Wadsworth in Genesee County.

* * *

The new type of colony house and gasoline heaters recently perfected by the Poultry Department are proving a success and it is hoped that a bulletin on that subject may be published early this summer.

* * *

Prof. Craig has recently returned from a three weeks' trip in the South. His time was spent mostly in Florida and Georgia in the fruit orchards. He spoke concerning the trip before a meeting of the Lazy Club, illustrating the talk with photographs and specimens of the fruits which he brought back.

* * *

The week before the Easter vacation Prof. Wing took a party of seventeen students to some of the prominent dairy farms around Syracuse. The annual judging competition also took place. At Wing R. Smith's, G. W. Myer took first prize, C. B. Tillson second, O. F. Ross and J. B. Shepard tied for third. At Stevens Bros.-Hastings Co., at Liverpool, N. Y., G. H. Moody and A. H. Knights tied for first place. The following students went on the trip: Myer, Tillson, O. F. Ross, Shepard, Moody, Knapp, Knights, Meeker, Hale, M. P. Jones, Osborn, Spencer, Barber, Bingham, Davis and Merry.

* * *

The Agricultural buildings have a large force at work on them. The manufacturing part of the Dairy Building is completed with the exception of setting doors, windows, stairs, floors and plumbing. The main building has the outer and inner walls carried above the first story.

* * *

The announcements concerning the Traveling School of Agriculture for this summer are now ready for distribution. An itinerary has been adopted. It is as folllows:

Ithaca, N. Y.	Bowie, Texas
Rochester, N. Y.	Fort Worth, Texas
Buffalo, N. Y.	Waco, Texas
Painesville, Ohio	Houston, Texas
Cleveland, Ohio	Galveston, Texas
Hudson, Ohio	Beaumont, Texas
Apple Creek (Wooster), Ohio	Lake Charles, La.
Columbus, Ohio	New Orleans, La.
Washington C. H., Ohio	Baton Rouge, La.
Xenia, Ohio	Vicksburg, Miss.
Springfield, Ohio	Jackson, Miss.
Champaign, Ill.	Starkville, Miss.
Bloomington, Ill.	Meridian, Miss.
Chicago, Ill.	Demopolis, Miss.
Wayne, Ill.	Selma, Ala.
Elgin, Ill.	Maplesville, Ala.
Freeport, Ill.	Montgomery, Ala.
Dixon, Ill.	Tuskegee, Ala.
Ames, Iowa.	Auburn, Ala.
Omaha, Neb.	Fort Valley, Ga.
Fremont, Neb.	Macon, Ga.
Lincoln, Neb.	Camak, Ga.
Grand Island, Neb.	Augusta, Ga.
Scottsbluff, Neb.	Williston, S. C.
Greeley, Colo.	Branchville, S. C.
Fort Collins, Colo.	Summerville, S. C.
Colorado Springs, Colo.	Charleston, S. C.
Manitou Jc., Colo.	James Island (boat)
Pueblo, Colo.	Columbia, S. C.
Trinidad, Colo.	Charlotte, N. C.
Texline, Texas	Danville, Va.
Amarilla, Texas	Richmond, Va.
Clarendon, Texas	Washington, D. C.
Childress, Texas.	West Chester, Pa.
Wichita Falls, Texas	Philadelphia, Pa.
Henrietta, Texas	Newark, N. J.
	Ithaca, N. Y.

This tentative itinerary is intended to show, in general, the region to be covered. It is printed for the purpose of securing the names of persons owning farms, plantations and ranches or other forms of agricultural activity of interest to the students of this school and, also, for the purpose of securing suggestions as to any changes in the route which may make the trip more valuable. In most instances, the towns mentioned are of no particular interest.

It is desired to sidetrack the car on which the party expects to live (including dining) as near to the places to be visited as possible. Where farms, plantations and ranches have their own siding, we would prefer to use it. We will be obliged to those making suggestions as to stops or extending invitations, if they will kindly state where the car can best be placed.

Address, Thomas F. Hunt, Professor of Agronomy, Cornell University, Ithaca, N. Y.

* * *

Miss Emma M. Lewis, who has been a student in the Nature Study department for the past two years, recently received an appointment from the Board of Education of Philadelphia, Pa. From April until the sea-

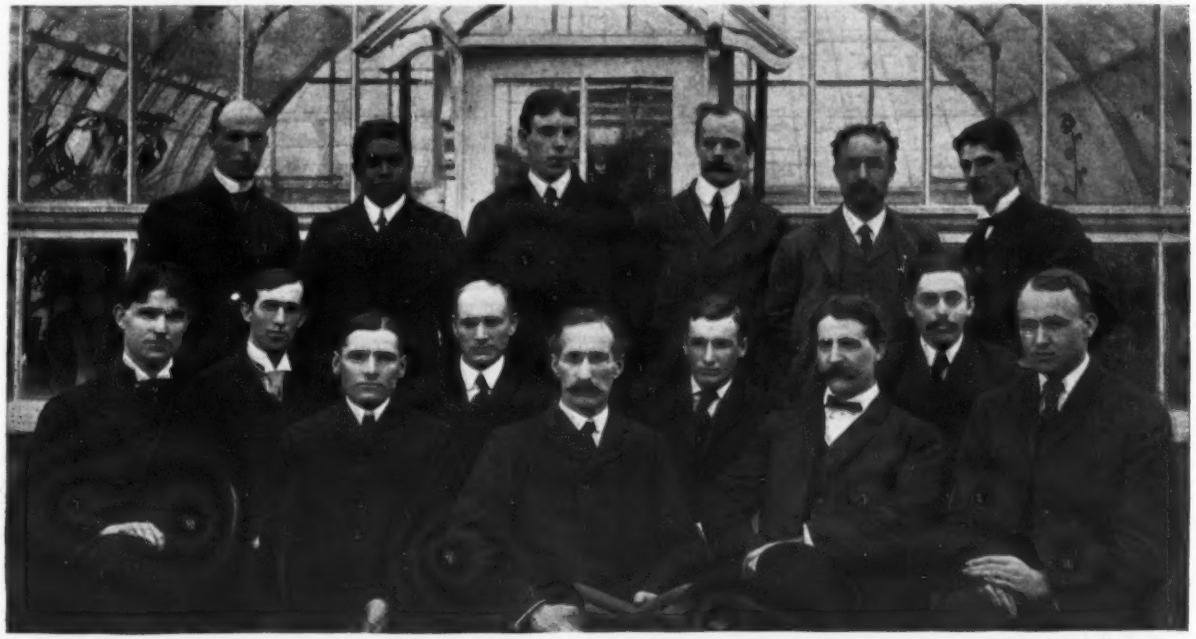


PHOTO BY MORGAN

GRADUATE STUDENTS IN HORTICULTURE, CORNELL UNIVERSITY, 1905-6

P. M. Novik I. B. DeMajumdar J. E. Howitt P. J. White M. J. Iorns L. F. Paull
C. I. Lewis J. C. Hogenson A. D. Taylor J. Eliot Coit
C. D. Jarvis R. W. Curtis Prof. John Craig W. H. Homer C. S. Wilson

son closes in October, Miss Lewis will have entire supervision of the school gardens of that city. Philadelphia was one of the first cities to use vacant lots for gardens for the school-children,—a phase of education which is now becoming of great importance in many cities.

* * *

The Poultry Department of Cornell University wishes to thank the following persons and firms for kindly donations.

Grand View Poultry Farm, Wyckoffs', Aurora, N. Y., 100 S. C. White Leghorn Eggs, one model food hopper; James Forsythe, Owego, N. Y., 3 S. C. Brown Leghorn Cockerels; Dr. E. M. Santee, Cortland, N. Y., 2 Brown Leghorn Cockerels; Mrs. Geo. E. Monroe, Dryden, N. Y., 2 Black Minorca Cockerels; Dr. Nottage, 2 food hoppers; F. W. Mann & Co., Milford, Mass., 1 power Bone Cutter, 1 hand Bone Cutter, 1 Clover Cutter; Humphrey & Co., Joliet, Ill., 1 Humphrey Bone Cutter; J. E. Wilson, Easton, Pa., 1 Bone Cutter; Sterns, Syracuse, N. Y., 1 Bone Cutter; Homer Mfg. Co., Homer, Mich., 2 hot water heaters; Alva A. Skinner, Greene, N .Y., Skinner Ideal Cramming Machine; Cypress Incubator Co., Buffalo, N. Y., 2 egg stands and Cyphers incubators; Prairie State Incubator Co., Homer City, Pa., 2 new Prairie State incubators, 1 brooder, 2 Universal Hovers; Cornell Incubator Co., Ithaca, N. Y., 4 No. 108 Egg New Cornell incubators, 1 Peep-o'-Day Brooder; Sure Hatch incubaton Co., Clay Center, Neb., 1 Sure Hatch Incubator; Geo. H. Stahl, Quincy, Ill., 1 Excelsior Incubator; Chas. A. Cyphers Inc. Co., Buffalo, N. Y., 1 Duck Machine, 2 No. 108 Model Incubators; Geo. L. Harding & Co., large collection of poultry foods and Poultry remedies.

FORMER STUDENTS

'98, M. S. A.; '00, Ph. D.—Dr. Stevenson Whitcomb Fletcher was born at Littleton, Mass., Sept. 10, 1876. He attended the district school until he was thirteen years old. During the following three years he lived at a logging camp at Cape Cod. In 1892 he entered the Massachusetts Agricultural College, where he graduated in 1896. While in College he worked for his own living, paying all of his college expenses himself.

Immediately after graduation Dr. Fletcher accepted a position as assistant horticulturist at the Massachusetts Agricultural Experiment Station. In

S. W. FLETCHER, PH.D., '00

September he came to Cornell as Fellow in Horticulture, and received his master's degree the following June. From 1898 to 1900 he was assistant in the Experiment Station at Cornell; in 1900 he received the degree of Ph. D. In the summer of 1900 he was instructor in nature study in the summer school.

From 1900 to July 1902, Dr. Fletcher was professor of horticulture at the Washington State College. From July, 1902, to 1903 he held a similar position at the University of

West Virginia, which position he resigned to come to Cornell in September, 1903. At Cornell, Dr. Fletcher's work was primarily to direct the Farmers' Reading Courses in the state; he also had charge of the winter course in agriculture, and assisted in the department of horticulture. While here, he took an active interest in the school gardens in the city of Ithaca.

In 1905 Dr. Fletcher accepted the chair of horticulture and landscape gardening at the Michigan Agricultural College.

In July, 1905, he was married to Miss Margaret Ralston of Chattanooga, Tenn.

'00 W.—Archibald S. Calkins, after a short illness of typhoid fever, died last November at Longmont, Colo. Mr. Calkins went to Longmont in 1903; he was employed as division foreman in the sugar factory at that place. The following item, taken from the Nov. 17th, 1905, issue of the *Longmont Ledger* shows in what high esteem he was held in that place:

"In disposition he was one of the most exemplary of young men and we cannot speak too highly of his Christian character. Always genial and kindly to his friends and acquaintances, it was a pleasure to meet and know him."

'98, Ph. D.—Prof. James G. Needham held the Goldwin Smith fellowship at Cornell in 1896. After leaving he was entomologist in charge of N. Y. State Field station for the study of aquatic insects and associate editor of the *American Naturalist*. At present he is professor of biology at Lake Forest College. Within a short time Prof. Needham will complete a college text-book of general biology, a Monograph on American Stone-flies and a handbook of N. American Dragon-flies.

'98, B. S. A.—Prof. E. Dwight Sanderson was State Entomologist of Texas for two years before going to New Hampshire to take a similar position in the entomological work of the Experiment Station. He is also in charge of zoology and botany at the N. H. Agricultural College. At present the attention of the station is devoted to the control of the brown-tail and gypsy moths. Although the fruit and trucking industries of New Hampshire are not well developed, Prof. Sanderson says that there is no lack of entomological studies.

'99, B. S.; '00, M. A.—Mr. Chas. B. Simpson is Government Entomologist of the Transvaal with his headquarters at Pretoria. He has been very successful in his fight against the locust plague and malarial bearing mosquitoes. The first of March, Mr. Simpson was to start for the United States and plans to be in Ithaca early in May. One of our students, Mr. Chas. W. Howard, A. B., '05, is assistant to Mr. Simpson, and writes that he is finding plenty of new problems to keep him busy. In addition to his regular office and field work, Mr. Howard is devoting considerable time to the insect pests of the cabbage.

'00, B. S. A.; '01, M. A.—In reply to our letter, Mr. Gordon M. Bentley tells us he is instructor of invertebrate and vertebrate zoology and of entomology at the University of Tennessee, Knoxville, Tenn. He is also assistant State Entomologist of that state.

'01, B. S. A.—Mr. D. L. Van Dine is the U. S. Government Entomologist of the Hawaiian Exp. Station, Honolulu. Mr. Van Dine is doing fine work especially along economic lines.

'05, Ph. D.—Prof. R. V. Chamberlin's present address is University of Utah, Salt Lake City. During the years 1902-04 he was the Goldwin Smith fellow at Cornell. After leaving here, he became assistant professor of zoology at the University of Utah and is now full professor in charge of that department. He has spent considerable time on the morphology and classification of Chilopods, Diplopods and Arachnida.

'01, B. S. A.; '04, A.M.—Mr. A. G. Ruggles wishes the *Cornell Countryman* every success in its mission, writing from the University of Minne-

sota and Experiment Station. St. Anthony Park, Minn., where he is assistant entomologist. During the first semester of the college year, he enjoys teaching, while the rest of the year is spent in investigations. Elected to Sigma Xi, 1906. At present he is assisting his chief, Prof. F. L. Washburn, in preparing a text-book of zoology.

'00, Ph. B.; '04, Ph. D.—Dr. Alex. D. MacGillivray became connected with Cornell during the years of 1889 and 1891, after receiving his bachelor's degree at Wooster, Ohio. Since 1892 he has held the position of assistant entomologist at Cornell University. Dr. MacGillivray's chief publications are: "Classification of *Thysanura*," "Classification and Description of New Species of Saw Flies," and "The Embryo of *Corydalis cornutus*." At present he is interested in the study of the wing venation of the *Hymenoptera* and the classification of North American Insects. Dr. MacGillivray has in addition to his regular teaching work, developed a very thorough laboratory course on scale-insects.

'03, Ph. D.—Dr. Wm. A. Riley was fellow at Cornell during the years 1898 and 1899, and is now instructor. His main studies have been upon insect morphology, histology and embryology. His thesis was upon the Development of the Skeleton of the Head of *Blatta*, besides issuing many minor papers on insect histology. At present Dr. Riley is working upon the structure of the insect eye and making preparations and photographs illustrating insect morphology.

'00, B. S. A.—Franklin Sherman, Jr.—After graduation taught in the Nature Study School at Cornell in the summer of 1900 and in September went to the position of Entomologist in the North Carolina Department of Agriculture at Raleigh, where he was also made entomologist to N. C. Crop Pest Commission and to the N. C. Experiment Station and Instructor in Entomology in the Agcultural College. In summer of 1902 Mr. C. O. Houghton, Cornell '92, was appointed temporary assistant, but not until June, 1904, was provision made for a permanent assistantship, when G. M. Bentley, Cornell '00, B. S. A., then at Union Academy, Belleville, New York, was appointed. Mr. Bentley remained for a year, resigning to accept a similar position at the University and Experiment Station at Knoxville, Tenn. Mr. R. S. Woglum (M. S. A., Cornell '05) was then appointed assistant, but almost simultaneously with his arrival in North Carolina, Mr. Sherman accepted the professorship of Entomology and Zoology at the Ontario Agricultural College, Guelph, Canada, leaving North Carolina for his new duties at the end of August,—almost exactly five years from time of beginning work there. On May 12, 1903, married Miss Grace Berry of Ashgrove, Virginia. "We have a toddling boy whose first unusual word was "bu" (bug,) so perhaps he will become a naturalist."

'95-'97, Sp.—Suguya Hari is Government Entomologist at the Island of Formosa near Japan.

'03, B. S. A.—E. J. Glasson, who has been in the employ of the Bureau of Plant Industry of the U. S. Dept. of Agriculture, having had charge of the investigation of the trucking industry of the Southwest, has recently returned to the Florida Peninsula to take up vegetable growing on his own account.

'05, W.—Mortimer F. Barrus of Silver Creek, N. Y., became especially interested in Botany while attending the winter course here. Last fall he entered as a Freshman, Wabash, College, Crawfordsville, Ind. Mr. Barrus expects to take the four year course and specialize in botany and plant disease, after which he will return to Cornell for graduate work.

'05, W. P. C.—Elmer Phillips is managing the poultry department on the farms of the Solvay Process Company at Tully, New York.

'05, W. P. C.—George A. Seaman is poultryman on the Pencoyd Farm at Bala, Pennsylvania.

"CORRECT CLOTHING"

We carry the largest and most complete assortment of Popular Price and Fine Clothing of any one in the city. Agents for the Stein-Bloch and Hart Schaffner & Marx Smart Clothing—Also Stetson & Hawes Hats—Monarch & Cluett Shirts —V Neck and Coat Sweaters. . . . .

"FRESHMAN CAPS"

BAXTER & SHEPARD

ONE PRICE, 126 E. State St.

SUITS AND OVERCOATS MADE TO ORDER

"If you get it from us it's right."

Buttrick & Frawley

ONE PRICE

CLOTHIERS AND FURNISHERS

We sell only Dependable Goods and as low as any store in New York State

Suits, Rain Coats, Over Coats and Trousers

Made by the Leading Manufacturers for us

Be as discriminating in selecting your Clothier as you are in choosing your College

WE RENT DRESS SUITS

118 EAST STATE STREET.

In writing to advertisers please mention THE CORNELL COUNTRYMAN

THE CUTS IN THE COUNTRYMAN

ARE MADE THIS YEAR AT THE
Photo-Engraving Department

OF THE

Telegram Printing Company

ELMIRA, N. Y.

FOR GOOD CUTS TRY THE TELEGRAM

Read The Elmira Telegram

CIRCULATION, LATEST
73,559 PER WEEK

PULLING AN OAR.

in college or in business calls for BRAWN and BRAIN.

In the whole wheat grain Nature has stored the material for building brain and brawn—but the white flour miller gives you only the starch in the wheat. You can't build muscle or brain out of starch. In

SHREDDED WHOLE WHEAT BISCUIT

you have all the body-building elements of the whole wheat prepared in digestible form. It builds soldiers at West Point and sailors for the Navy at Annapolis. It is on the "training table" of every college and university.

A food for the brain-worker, the outdoor man and the indoor man, for any meal, for any season in any climate.

"It's All in the Shreds"

THE NATURAL FOOD COMPANY

Niagara Falls, N. Y.

THE 1906 NIAGARA GAS SPRAYER

MOUNTED ON FIFTH WHEEL ELECTRIC TRUCK, WITH 8 1-2 FT. STEEL TOWER, GEAR AGITATOR AND $25.00 OUTFIT OF ALUMINUM FITTINGS. CAPACITY 100 GALLONS. PRICE $200.00. : : : : : : : : :

THE 20TH CENTURY SPRAYER

THE LEADING ORCHARD AND PARK SPRAYER OF THE WORLD

Awarded Gold Metal at St. Louis, Missouri, and Portland, Oregon

Kindly note particularly the following points which we are sure will commend the machine to any fruit grower, viz:

Construction. Finest in every respect.

Repairs. No machine made is less likely to need repairs.

Agitation. Either hand or power. No better Agitator made.

Sizes. 50, 100, 150 or 200 gallons.

Capacity. Will supply four 100-foot leads of hose, each with four nozzles, if desired, and make a perfect mist.

Operation. *No Pump*, therefore *no pumping*. Absolute power from Liquid Carbonic Gas. Easy to secure and maintain 100 pounds pressure. Abundant provision for safety.

Nozzle. Our Nozzle Protector allows nothing to pass which can clog the finest nozzle. *A very important point.*

Adaptability. Wide range. Does anything any other Sprayer will do, and more. Sprays the largest *trees* down to smallest *shrub*. Does nursery, crop, truck and small fruit spraying. Is splendid for all kinds of white-washing.

Simplicity. Any bright boy (a twelve-year old girl has done it) can drive team and attend to power. No skill required.

Economy. Save time, labor and material enough to more than pay for gas. Carbonic gas improves the spraying mixture.

A Practical Test Made by Cornell

CORNELL UNIVERSITY
COLLEGE OF AGRICULTURE
Ithaca, N. Y., L. H. Bailey, Director.

University Extension of Agriculture, Bureau of Nature-Study and Reading Courses as provided for by the State of New York. Bureau of Nature Study. John W. Spencer, Supervisor.

Cost of spraying 8¼ acres (of grapes) two times, first by hand pump and last by gas pressure:

Man and team	$12 60	
Arsenate of lead	12 00	
Copper sulphate	30	
Man to pump	5 60	
Man to hold nozzle	6 60	
*Half tank gas	2 00	
		$39 10

SECOND SPRAYING

Man and team	$ 5 60	
Arsenate of lead	8 00	
Copper sulphate	30	
Man to attend nozzles	2 25	
Gas	7 00	
		$23 15

Total cost of two spreyings ---- $62 25

First spraying used 1500 gallons mixture.

Second spraying used 1000 gallons mixture.

Last spraying cost $15.95 less than first (*About 2⅝ acres of the first spraying was done with the NIAGARA GAS SPRAYER. The gain then would be, over all hand work, about $20.00.)

Saving in Material, one-third.
Time Required, less than one-half.
Cost of Labor, less than one-third.

Why don't you use a NIAGARA, it will pay for itself in a season

THE 1906 MACHINE

We take pleasure in calling your attention to a few of the new features of our 1906 model:

The Hand Hole is much larger, making thorough cleaning easy.

The Filling Plug is entirely independent of the hand hole.

The Agitator Shaft is horizontal instead of vertical.

Our New Bamboo Rod has 9-16 inch diameter aluminum lining instead of ¼ inch brass, and yet weighs one-half pound less than brass-lined rod.

Hose Couplings. We have a specially designed connection with double clamp from which the hose cannot pull off.

Our New Leakless Rod Valve cannot be beaten.

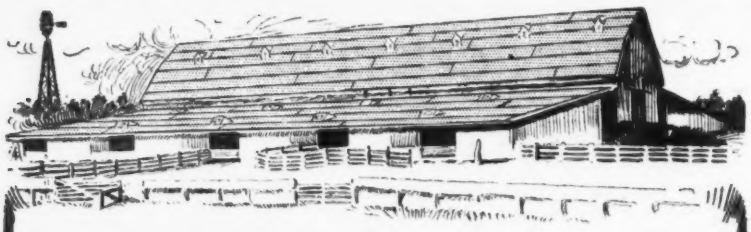
Aluminum Y's, Aluminum Rods, Aluminum Nozzles. No clogged nozzles.

SOLD ON ITS MERITS. ABSOLUTELY GUARANTEED

The Niagara Sprayer Company

MIDDLEPORT, NEW YORK

PIONEERS OF ALUMINUM FITTINGS



Roofed With Paroid Roofing

Many of the largest farm and poultry buildings in the country as well as government and railroad warehouses, factories etc, are now roofed and sided with Paroid Roofing. The above illustration shows the largest stock barn in Minnesota, covered with Paroid. In spite of cheap imitations it grows in popularity, because every one who uses it finds it economical, extra strong, durable and thoroughly satisfactory. Make no mistake—get Paroid.

Light slate color; contains no tar; does not crack nor run, does not taint rain water. keeps buildings dry and warm, looks well, lasts long, spark, water, cold, heat, smoke and gas proof. That's why it's so popular.

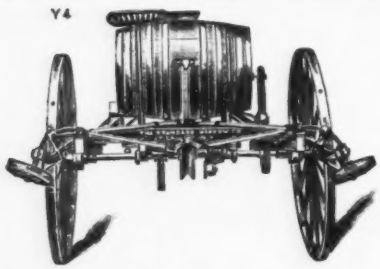
Sample Free. To show you exactly what it is we'll send you a free sample and name of nearest dealer. Investigate **now.** For a 2 cent stamp we'll send book of building plans for poultry and farm buildings.

F. W. BIRD & SON, Makers.

Originators of Free Roofing Kit—fixtures for applying in every roll.

East Walpole, Mass., *Established 1817.* **Chicago, Illinois.**

Y4



The STANDARD Liquid Sprayer

MANUFACTURED BY

THE STANDARD HARROW CO

Dept. S, UTICA, N. Y.

A perfect sprayer that overcomes all the troubles of pump and nozzle machines.

Thoroughly profitable for the grower of potatoes, beans, peas, etc. Especially adapted to kill wild mustard without injury to crop.

Send for catalog of Powder Duster, Manure Spreaders Potato Harvesters, etc.

STANDARD HARROW CO.,
Utica, N. Y.

WARSAW, N. Y., November 7, 1905

GENTLEMEN:—In answer to your communication of recent date as to my experience in spraying for the purpose of destroying wild mustard, I take pleasure in giving you the benefit of my experience.

I purchased one of the Standard Sprayers last spring through M. A. Richards of Warsaw. My farm is situated at Gainesville, in this County, and for many years has been covered with wild mustard, which showed itself in great profusion in every spring crop, retarding the growth of the grain and sapping the soil to such an extent that I was unable to secure more than half a crop. I learned through the report of the State Experiment Stations that wild mustard could be killed by spraying. I had not much faith in the remedy, but concluded it was worth the experiment. I had eight acres of barley which was sown rather late, and as I was late in giving my order for the Sprayer, when it came the grain was about six to eight inches high and the mustard was in blossom.

I concluded to try the experiment on one acre and watch the result. I mixed one barrel of the solution composed of eight pounds of blue vitrol to forty gallons of water and applied it. When mixed ready for use the solution made forty-five gallons. The second day after the spraying the mustard was practically all withered and dead, but the leaves of the grain turned red and resembled a field of grain that was badly "rusted." Nearly everyone who saw it said: "You have killed the mustard, but you have killed the grain as well," and I thought so myself. Within two weeks the grain that had been sprayed improved so that it was the most thrifty portion of the field, and the improvement was plainly discernable up to the time of harvest, when we found that in that portion of the field no mustard had gone to seed, and the grain was easily 50 per cent. better than on the balance of the field. I have no hesitation in saying that this treatment will eradicate wild mustard from the land without material injury to the grain crop, but I believe that better results can be obtained by earlier application and reducing the strength of the solution to about six pounds of vitrol to forty gallons of water. This is the formula I will use next season, and I shall use it upon every acre of grain I sow.

Very truly yours,

FRANK W. BROWN.

OUR NEW CLUB OFFERS ARE THE BEST YET

Cornell Countryman	$1.00	$1.50
American Farming Magazine	1.00	
	$2.00	
Cornell Countryman	$1.00	$1.50
Cosmopolitan	1.00	
	$2.00	
Cornell Countryman	$1.00	$2.50
Cosmopolitan	1.00	
Review of Reviews	3.00	
	$5.00	
Cornell Countryman	$1.00	$2.00
Cosmopolitan	1.00	
American Farming Magazine	1.00	
	$3.00	
Cornell Countryman	$1.00	$1.15
And one of the following		
Successful Poultry Journal	.50	
Reliable Poultry Journal		
Ohio Poultry Journal		
The Industrious Hen		
The Northwestern Poultry Journal		
Island Poultry Journal		
Poultry Tribune		
Poultry Keeper		
	$1.50	
Cornell Countryman	$1.00	$1.25
And any two of the above	1.00	
	$2.00	
Cornell Countryman	$1.00	$1.25
American Fancier	1.00	
	$2.00	
Cornell Countryman	$1.00	$1.50
American Fancier	1.00	
And any of the 50c Magazines	1.00	
	$3.00	
Cornell Countryman	$1.00	$1.25
Fanciers Monthly	.75	
	$1.75	
Cornell Countryman	$1.00	$1.60
Country Gentleman (weekly)	$1.50	
	$2.50	
Cornell Countryman	$1.00	$2.00
Country Gentleman (weekly)	1.50	
and either		
Farming	1.00	
Garden Magazine or		
Cosmopolitan		
	$3.50	
Cornell Countryman	$1.00	$2.50
Country Gentleman (weekly)	1.50	
And any two of the $1.00 magazines	2.00	
	$4.00	

Address all letters to CORNELL COUNTRYMAN

ITHACA, N. Y.

In writing to advertisers please mention THE CORNELL COUNTRYMAN.

We Do Your Mending Free

FOREST CITY LAUNDRY

E. M. MERRILL

Phone **209 North Aurora Street**

ROBINSON'S PHOTOGRAPH SHOP

205 NORTH AURORA STREET

HIGH GRADE WORK ONLY

START RIGHT

Begin your File now by having your first volume of the Countryman bound at

J. WILL TREE'S

103 North Tioga Street.

ESTABLISHED 1876.

DUNNING & STEVENS,

Live Stock Commission Merchants,

Room 1 Live Stock Exchange **East Buffalo, N. Y.**

PIONEER GUARANTEED NURSERY STOCK AT WHOLESALE PRICES.

All stock guaranteed disease free—true to name—pure bred and heavy crop producers. Full value for every dollar sent us. No agent's commission. Write for complete price list. We will save you money.

HART PIONEER NURSERIES

Established 1865. Fort Scott, Kan

Text Books and Departmental Supplies

FOR ALL UNIVERSITY COURSES

ALWAYS IN STOCK

NOTE: - Many of the required Texts in excellent condition at greatly reduced prices may be had at the Eddy street Branch.

THE CORNER BOOK STORES

State and Tioga Streets — TAYLOR & CARPENTER ITHACA, NEW YORK — Buffalo & Eddy Streets

In writing to advertisers please mention THE CORNELL COUNTRYMAN

The Latest Styles in Photographs at right prices. All work guaranteed

We copy any Photo to fit watch or locket. Our Quick as a Wink system used almost exclusively

Kodaks and Cameras For Sale, Rent or Exchange. Bargains in Second-hand Goods

Amateur developing and printing rushed if necessary. PHOTOGRAPHER Next P. O. Both Phones

Van Buren

R. A. HEGGIE & BRO. Make Badges and Mend Things . .

WATCHES AND JEWELRY ON SALE.

136 East State Street

WE MANUFACTURE

Anything of Wood from Special Designs

WE FURNISH

Residences, Dormitories, Offices,
Boarding Houses, etc., etc., etc.
Estimates Given if Desired.

Housefurnishers. H. J. BOOL CO. Manufacturers.

Opp. Tompkins County Bank. Buy of the Maker.

GET WISE

TO DO YOUR PRINTING

CHAS. H. WISE

(Successor to Stephens Pub. Co.)

FINE JOB PRINTING

BATES BLOCK

COR. AURORA & SENECA STS. ITHACA, N. Y.

Have your Laundry Done at

THE STUDENT LAUNDRY AGENCY

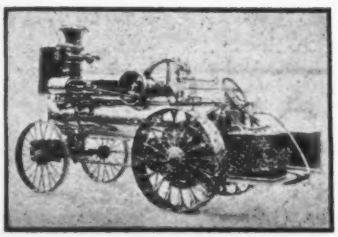
420 EDDY STREET. PHONES—BELL 676, ITHACA 73A.

RUN BY STUDENTS ALL THE YEAR ROUND

A. D. ALCOTT '06 **P. E. CLAPP '06**

JOHN B. LANG ENGINE WORKS

ITHACA, N. Y.



Traction and Portable Engines in Sizes 10 to 25 H. P.

The above cut represents the most complete and efficient traction engine on the market. For power, simplicity, durability and economy of operation, this machine ranks first. We guarantee against defective material and workmanship for one year.

SEND FOR CATALOGUE

Eggs for Hatching

YOU OUGHT TO HAVE
CORNELL COCKRELS With the CORNELL CROW
AND
CORNELL PULLETS With the CORNELL GO

DUCKS—Pekin, Rouan, Indian Runner, White Muscovey

FOWLS—Barred Plymouth Rocks, White Wyandottes, Black Minorcas, Brown Leghorns, White Leghorns, Buff Orpington, Light Brahmas.

C. U. Dept. of Poultry Husbandry, Ithaca, N. Y.

Herron's Shoes

Fall 1905

THEY LOOK better than ever, and were good enough before. $4.00 and $5.00 grade look like $6.00

SEEN OUR WINDOWS?

Herron.

Opp. Ithaca Hotel

In writing to advertisers please mention THE CORNELL COUNTRYMAN

CASCADILLA-DINING HALL

Best table and most comfortable dining room on the Hill

SEATING CAPACITY 300 — MRS. EMMA APKER

NORWOOD'S

TAILORING SHOP is the place to go for a new suit of clothes or a pressing contract. . .

THEY ARE LEADERS

411 E. STATE ST.

G. F. Morgan

THE NEW CORNELL UNIVERSITY PHOTOGRAPHER

Try him and see what he can do. Campus Views, Lantern Slides, and all kinds of reproduction work his specialty.

Phone 281 Bell or address 314-316 Huestis St. Ithaca, N. Y.

UNITED STATES AND FOREIGN COPYRIGHTS — PATENTS AND TRADE-MARKS

A COPYRIGHT

WILL PROTECT YOU FROM PIRATES.

And make you a fortune. If you have a PLAY, SKETCH, PHOTO, ACT, SONG or BOOK that is worth anything, you should copyright it. Don't take chances when you can secure our services at small cost. Sendfor our SPECIAL OFFER TO INVENTORS before applying for a patent, *it will pay you.* HANDBOOK *on patents sent* FREE. We advise if patentable or not, FREE. We incorporate STOCK COMPANIES. Small fees. Consult us.

WORMELLE & VAN MATER,
Managers,
Columbia Copyright & Patent Co. Inc.,
WASHINGTON, D. C.

Rothschild Bros.

Students Room Supplies

Rugs, Sofa Pillows, Poster Pictures, Lamps,
Match Safes, Lunch Baskets, Souvenir Flags

The Department Store that has Everything for the Students

HOLSTEIN-FRIESIAN CATTLE

In a herd of over one hundred head of animals, I have FORTY daughters of the GREAT bull PIETERTJE HENGERVELD'S COUNT DE KOL, who has FIFTY THREE A. R. O. daughters; also a number of grand-daughters, all of the highest quality and marked individuality. The animals and their calves are offered for sale and should attract farmers and breeders.

Correspondence solicited and visitors welcomed.

WING R. SMITH, LAKELAND FARM SYRACUSE, N. Y.

In writing to advertisers please mention THE CORNELL COUNTRYMAN

S. T. NEVINS
326 HUESTIS ST.
CLOTHING AND GENT'S FURNISHINGS
Merchant Tailoring

Your Laundry
will always receive prompt attention if you send it to
JUSTIN & REID
407 HUESTIS STREET
Ithaca Phone 452-X.
J. DeWITT JUSTIN '06 WALKER REID, '08

LIGHTNING"
WHITEWASH SPRAYER, NO. 28
Whitewash your poultry-house and stables easily, rapidly, with the "Lightning" Whitewash Sprayer. Kills lice and vermin. Can't clog. Also for spraying trees, washing wagons, etc. Double action pump. Sprays 30 ft. high. Has 3½ ft. heavy hose, extension rod, brass nozzles, steel stirrup, ball valves. All brass, $3.50; Galvanized Iron, $2.50. Cash with order. Exp. paid. Agents wanted. D. B. Smith & Co., Utica, N. Y.

LARGE English Berkshire Swine The strains that weigh 250 pounds at six months and 500 pounds at one year. Pigs of either sex, service Boars, Gilts open or bred. A large percentage of imported blood insures quality as well as size in our herd.

H. C. & H. B. HARPINDING
DUNDEE, N. Y.

Ithaca Hotel

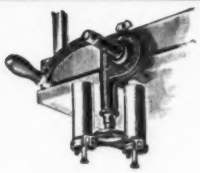
Headquarters For Students
American and European Plan
Music in
Dutch Kitchen
Every Evening
J. A. & J. H. GAUSER, . Props

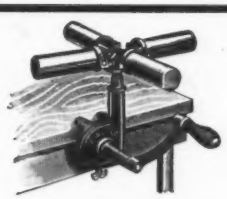
You cannot afford to pass us by

We can save you from $10.00 to $15.00 on a Suit or Overcoat

Facts are convincing Come in and get our Prices

W. F. FLETCHER
Merchant Tailoring
The Corner Tailor Shop 409 EDDY STREET





Are you interested in Dairying?

We manufacture and sell the most complete and up-to-date line of specialties for the handling of milk in any quantity, and for the manufacture of Butter and Cheese.

"Simplex" Link Blade Cream Separators, "Simplex" Combined Churn and Butter Workers, "Simplex" Regenerative Pasteurizer, "B & W" Double Surface Heater, "B & W" Improved Check Pump, "Facile" Babcock Milk Testers, Steel Gang Cheese Presses and Hoops, "Lapham" Brand Seamless Bandage, Hansen's Celebrated Danish Dairy Preparations.

Write for our catalogue and prices.

D. H. BURRELL & CO. LITTLE FALLS, N. Y.

UNIVERSITY BOOK BINDERY

PRACTICAL BOOK BINDING IN ALL ITS BRANCHES

F. GEORGE REED, - - - 118-124 South Tioga Street.

Boys and Girls

The Best Children's Magazine.
Makes the Best Christmas Present for Young People.

Boys and Girls
ITHACA, NEW YORK

T. R. THOMAS & CO.
Jobbers in
FOREIGN AND DOMESTIC FRUITS, PRODUCE, ETC
Established 1854 UTICA, N. Y.

BUY A JOHANNA BULL

We have 15 for sale; from 5 weeks to 14 months old. Price $25 to $65. They are out of great producing cows and sired by

JOHANNA AAGIE'S LAD

His 4 nearest dams averaged 23.6 lbs butter in 7 days. He is a son of

Sarcastic Lad

Grand Champion Bull, World's Fair, St. Louis.

JOHANNA AAGIE

Made butter at a food cost of 4 6-10 cents per lb.

THEY ARE MONEY MAKERS

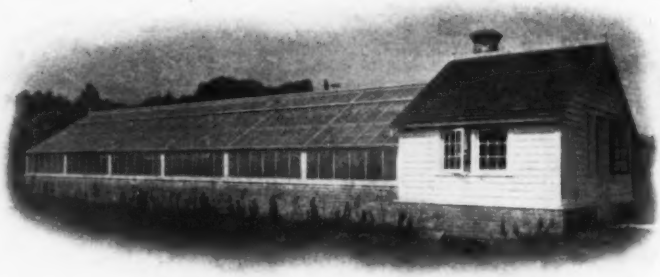
We have tested most of the leading varieties of Oats offered in America. Some said to yield 312 bushels per acre.

THE PEDIGREE OATS

Are the best we have found. This test is worth something to you. Yield 76 bu. per acre. Price $1.00 per bu. Bags furnished.

THE WINTERS FARM, Smithboro, N. Y.

In writing to advertisers please mention THE CORNELL COUNTRYMAN



ANOTHER SNUG PROPOSITION

Here is a practical working proposition 50 feet long by 18 wide, with a potting room housing the boiler, and ample room for bench, etc. To grow flowers and vegetables requiring different temperatures we divide the green house into two compartments. For out of season vegetables and cut flowers, from violets to orchids, this is just the layout to start off with.

SEND FOR COLLECTION OF CUTS, 9-G

LORD & BURNHAM COMPANY

GREENHOUSE DESIGNERS AND MANUFACTURERS

1133 Broadway, Cor. 26th Street, New York

Boston Branch: 819 Tremont Building

America's Leading Horse Importers

Another Sweeping Victory at the AMERICAN ROYAL, Kansas City

Our Percheron and French Coach Stallions won every First Prize and every Championship They came in Competition TWENTY-TWO times and Won FIRST TWENTY-TWO times : : : : : :

McLAUGHLIN BROS.

St. Paul, Minn. Kansas City, Mo. Columbus, O.

CORNELL UNIVERSITY

College of Agriculture

The College of Agriculture is one of several co-ordinate colleges comprising Cornell University. The work of the College of Agriculture is of three general kinds: The regular teaching work; the experiment work; the extension work. The courses of instruction fall in the following groups:

1. Four-year course, leading to the degree of Bachelor of the Science of Agriculture (B. S. A.). As a variation, the last two years may be chosen in subjects pertaining to Landscape Architecture and Out-door Art. In the Graduate Department of the University students may secure the Master's and Doctor's degrees (M. S. A., and Ph. D.)

2. Special two year courses. (a) Agricultural Special. (b) Nature-Study Special.

3. Winter-Courses of 11 weeks: (a) General Agriculture. (b) Dairy Industry. (c) Poultry Husbandry. (d) Horticulture. (e) Home Economics.

Staff of the College of Agriculture. 1906.

L. H. BAILEY, Director.

I. P. ROBERTS, Professor of Agriculture, Emeritus.

Agronomy:
T. F. HUNT,
J. W. GILMORE,
J. L. STONE,
S. FRASER,
G. W. TAILBY.

Animal Husbandry:
H. H. WING,
M. HARPER,
J. E. RICE (Poultry Husbandry).
R. C. LAWRY.

Dairy Industry:
R. A. PEARSON,
H. C. TROY,
W. W. HALL,
W. E. GRIFFITH,
H. L. AYRES.

Horticulture:
JOHN CRAIG,
C. S. WILSON
C. E. HUNN,

Agricultural Chemistry:
G. C. CALDWELL,
G. W. CAVANAUGH,
J. A. BIZZELL.

Reading-Courses:
G. W. HOSFORD,
MARTHA VAN RENSSELAER.

Soils:
E. O. FIPPIN,
C. W. MANN.

Entomology:
J. H. COMSTOCK,
M. V. SLINGERLAND,
A. D. MCGILLIVRAY,
W. A. RILEY,
T. J. HEADLEE,
P. HAYHURST,
J. C. BRADLEY.

Plant Pathology:
G. F. ATKINSON,
H. H. WHETZEL.

Rural Economy:
L. H. BAILEY,
G. N. LAUMAN.

Outdoor Art:
WARREN MANNING,
BRYANT FLEMING,
A. D. TAYLOR.

Agricultural Meteorology:
W. C. DEVEREAUX.

Nature-Study:
JOHN W. SPENCER.
MRS. J. H. COMSTOCK,
ALICE G. MCCLOSKEY,
R. W. CURTIS.

Extension Teaching:
G D. BRILL.

IN YOUR PLACE

We try not to forget that, were we in your place, we would want to know the reasons why Tubular Cream Separators are the most efficient, durable, and easy to operate.

The closer skimming done by Tubulars is not a miracle, but is merely the result of a better design than is found in any other separator.

Tubular bowls generate over twice the skimming force any other bowl can produce, consequently, Tubulars skim at least twice as clean as any other separator. And, Tubulars generate this double amount of skimming force, because Tubular bowls are long and slender, turning twice while other bowls turn once, without traveling at any greater circumferential velocity than slower bowls of greater diameter.

Just as one horse can travel twice around a half mile track in the same time another horse takes to travel once around a mile track, so a slender Tubular bowl can turn twice while a bowl twice as wide turns once. One horse goes no faster than the other—neither does the steel in the slender Tubular bowl move any faster than the steel in a wider, slower bowl. But, because the Tubular bowl turns twice while other bowls turn once, the Tubular bowl generates twice the skimming force and thus skims twice as clean as others.

That is the interesting and scientific reason why Tubulars are the most efficient skimmers. We know you will not forget Tubular superiority, now that you understand the reason.

Write for our complete catalog,—and learn some other advantages belonging, by patent rights, exclusively to Tubulars.

THE SHARPLES SEPARATOR CO.

WEST CHESTER, PA.

Toronto, Can. Chicago, Ill.